REMARKS/ARGUMENTS

In this Amendment, Applicants have amended independent claims 1 and 12 to obviate the Examiner's rejections under 35 U.S.C. § 112, first paragraph. While Applicants respectfully do not agree with the Examiner, Applicants have deleted the subject matter to further the prosecution of the patent application.

In the Office Action, the Examiner has rejected the independent claims of the application, i.e., claims 1 and 12, based on Haake in view of Ames. The Examiner argues that Haake discloses that the size of the groove is such that the fiber optic element can adequately fit without extending outside the top surface of the workpiece. Further, in the alternative, the Examiner argues that if a tighter fit between the groove and the fiber is required, that Ames discloses fibers (12) disposed in "tight fitting grooves (15)." The Examiner argues that it would have been obvious to modify the grooves of Haake based on Ames "because the amount of material removed from the workpiece to make the groove would be reduced, thereby ensuring a higher degree of structural integrity of the workpiece." Applicants respectfully traverse the Examiner's rejections as will be discussed below.

First, Applicants respectfully submit that Haake, as previously discussed, does not disclose a recess introduced into the surface of the workpiece where the recess has a breadth and depth matched to a diameter of the optical fiber. In Applicants' invention, the recess in the surface of the workpiece has a breadth and depth matched to a diameter of the optical fiber arranged in the recess because the Bragg grating optical fiber sensor that is arranged in the recess is used for the claimed measuring arrangement for testing workpieces (claim 1) and the claimed method for metrological instrumentation of workpieces (claim 12). Thus, as claimed and as disclosed in Applicants' specification at least at page 5, lines 5-8, the breadth and depth of the recess is "consequently" matched to the diameter of the Bragg grating optical fiber sensor. Applicants again respectfully submit that even if Haake discloses a groove 40 as a recess in a workpiece, that

the groove does not have a breadth and depth matched to a diameter of the optical fiber 16 since the ***groove must also contain*** a metallic material 18.

In Haake, as can be clearly seen in Figure 5 and as disclosed at col. 8, lines 57-63, the breadth and depth of the groove 40 must be formed larger than the diameter of the fiber 16 because molten metallic material 18 must also be applied in the groove. The molten metallic material 18 is used to affix the fiber 16 in the groove 40. With the structure of Haake, a fracture in the metallic workpiece will also fracture the metallic material 18 and damage the fiber 16, which is also surrounded by a metal coating 34, such that the fracture can be detected.

Thus, Applicants respectfully submit that Haake does not disclose Applicants' claimed invention where the recess in the workpiece has a breadth and depth matched to a diameter of the optical fiber. In Haake, the distance between the fiber and the groove is considerable in breadth and depth. This is so because in Haake, the molten metallic material 18 is filled in the groove and the metal coated fiber is disposed in the molten metallic material. In Applicants' invention, the recess has a breadth and depth matched to a diameter of the optical fiber because no molten metallic material is used with the Bragg grating sensor. Therefore, Applicants respectfully submit that Haake does not disclose Applicants' claimed recess introduced into the surface of the workpiece where the recess has a breadth and depth matched to a diameter of the optical fiber even if Haake discloses that the size of the groove is such that the fiber optic element **"can adequately fit"** without extending outside the top surface of the workpiece, as argued by the Examiner.

Further, Applicants respectfully submit that Ames does not teach disposing fibers (12) in "tight fitting grooves (15)" and, consequently, even if Haake could be modified by Ames, the modified Haake reference still would not disclose Applicants' claimed recess that has a breadth and depth matched to a diameter of the optical fiber. In Ames, a fiber optic roll sensor or a fiber optic pitch sensor is disclosed. The fibers 12 are placed in notches 15 which merely

"provide a space" so that the optical fibers 12 are not crushed between the cage 14 and the mass 16 during shock events. Col. 2, lines 39-44. Thus, in Ames, any recesses do not have a breadth and depth matched to a diameter of the optical fiber as claimed by Applicants, rather, the notch 15 merely provides a "space" so that the fiber is not crushed by the mass 16. The reason Applicants claim the feature where the recess in the surface of the workpiece has a breadth and depth matched to a diameter of the optical fiber is because in Applicants' invention, the relationship is required because the fiber must be in sufficient contact with the workpiece such that the claimed **measuring arrangement** for testing the **workpiece** (claim 1) and the claimed method for **metrological instrumentation** of the **workpiece** can be accomplished. In Ames, a "space" is merely provided for the fiber to prevent it from being crushed by a moving mass 16. The reason Ames merely provides a "space" for the fiber, instead of providing a recess in the surface of the workpiece that has a breadth and depth matched to a diameter of the optical fiber, is because Ames operates on a totally different principle than Applicants' claimed invention. In Ames, the "space" for the fiber is not even contained in a workpiece that is measured. Rather, the space is formed in a cage 14. The cage encloses a mass 16 and a gap 20 is disposed between the cage and mass, allowing the mass to move within the cage when the structure of the cage and enclosed mass rolls or pitches. This movement of the mass within the cage causes the weight of the mass to be borne by different combinations of fibers in the cage. The spaces for the fibers in the cage merely prevent the fibers from being crushed by the mass as it moves. Thus, the spaces in Ames do not have a breadth and depth matched to a diameter of the optical fiber as claimed by Applicants because the spaces have nothing to do with any measurement of a workpiece. The spaces are not formed in any workpiece that is measured, and thus, are not disclosed as having a breadth and depth matched to a diameter of the optical fiber. In fact, quite the contrary is true. The whole purpose of the spaces is to prevent the fibers from being crushed by the moving mass. If the spaces of Ames were "tight fitting grooves" in the cage, as argued by

the Examiner, it would most likely increase the risk of damage to the fiber by the moving mass. Therefore, Applicants respectfully submit that Ames does not disclose the claimed features of Applicants' invention where a recess is introduced into the surface of a workpiece that is measured and where the recess has a breadth and depth matched to a diameter of the optical fiber, and therefore, even if Haake could be modified by Ames, the modified reference still would not disclose Applicants' claimed invention.

Further, Applicants respectfully disagree with the Examiner's argument that "if a tighter fit between the groove and fiber is required" it would have been obvious to modify the grooves of Haake "because the amount of material removed from the workpiece to make the groove would be reduced, thereby ensuring structural integrity of the workpiece", even if Ames discloses tight fitting grooves. As discussed above, Haake requires that the breadth and depth of the groove 40 must be formed larger than the diameter of the fiber 16 because molten metallic material 18 must also be applied in the groove. Therefore, even if less material was removed from the workpiece to form the groove, this still would not result in any "tighter fit between the groove and the fiber", and certainly would not result in the claimed feature of the recess having a breadth and depth matched to a diameter of the optical fiber. Haake still requires that the groove be formed larger than the diameter of the fiber 16 because molten metallic material 18 must also be applied in the groove. In fact, because of this requirement in Haake, Applicants respectfully submit that it is impermissible to modify Haake as argued by the Examiner because Haake would then not be suitable for its intended purpose if "a tighter fit between the groove and the fiber" is provided. The modified Haake reference would certainly be unsuitable for its intended purpose if the recess has a breadth and depth matched to a diameter of the optical fiber. No molten metallic material could then be included in the groove of Haake.

Additionally, Applicants respectfully submit that they do not claim the relationship between the groove and the diameter of the fiber in order to reduce

the size of the groove for structural integrity purposes. It is not based upon keeping the groove as small as possible in order to increase the structural integrity of the workpiece, as apparently argued by the Examiner. Applicants claim it because the fiber has to measure the workpiece.

Therefore, Applicants respectfully disagree with the Examiner that "if a tighter fit between the groove and fiber is required" it would have been obvious to modify the grooves of Haake. Applicants respectfully submit that there would be no motivation to modify Haake based on the Examiner's argued motivation and that such a modification would result in Haake not being suitable for its intended purpose.

Additionally, Applicants also respectfully traverse the Examiner's argument that it would have been obvious to include any Bragg grating sensor of Ames in Haake. Applicants respectfully submit that there would be no motivation to include such a sensor in Haake. In Applicants' invention, a Bragg grating sensor is used because, as discussed above, the invention is used for the claimed measuring arrangement for testing workpieces (claim 1) and the claimed method for metrological instrumentation of workpieces (claim 12). For this claimed testing and metrological instrumentation, the Bragg grating sensor is positioned within a recess that has a breadth and depth matched to a diameter of the fiber. No molten metallic material is used. Clearly, Haake alone cannot disclose these features of Applicants' invention. Applicants also respectfully submit that there would be no motivation to include the Bragg grating sensor of Ames in Haake. There would be no need to. In Haake, as taught, a fracture in the workpiece results in damage to the fiber 16. "[T]he resulting damage to the fiber optic element 16 itself will attenuate the transmitted light such that the fracture in the workpiece may be detected." Col. 6, lines 4-8. Thus, all that is required in Haake is that a fiber be damaged as a result of a fracture of the workpiece so that the fracture can be detected. Applicants respectfully submit there would be no motivation to include a Bragg grating sensor in Haake for this purpose.

Further, even if a Bragg grating sensor could physically be included in Haake, Applicants respectfully submit that such a sensor could not serve the purpose argued by the Examiner in the Office Action. The Examiner argues that including such a sensor would have been obvious because the Bragg gratings "would allow for determination of changes in the tension." First, Applicants respectfully submit that the optical fiber in Haake does not have a purpose of determining changes in tension. It is used to detect a fracture in the workpiece. Thus, there is no need for "determination of changes in the tension" in Haake.

Further, Applicants respectfully submit that the Bragg grating sensors of Ames are not even utilized to determine any changes in the tension in a workpiece. The tensions detected in Ames are tensions in the fiber itself. See, for example, the disclosure cited by the Examiner in the Office Action where this disclosure discusses "[t]he difference in tension between the optical fibers 12" and "[c]hanges in the tension in each optical fiber 12". (emphasis added). Thus, the tensions are detected in the fibers to determine the pitch or roll of the fiber optic pitch or roll sensor. Therefore, Applicants respectfully submit that including the Bragg grating sensors of Ames in Haake could not provide for allowing for determination of changes in the tension of a workpiece, as apparently argued by the Examiner. It would merely provide for detecting tensions in the fibers themselves, which as taught in Ames, is used for detecting pitch and roll. There would be no motivation to detect pitch and roll in the system of Haake.

Further, Applicants respectfully submit that including the Bragg grating sensor of Ames in Haake could not even result in the tension being determined in the fibers themselves. In Haake, the Bragg grating sensor would be included in the molten metallic material. As disclosed in Haake, this material "has a relatively large coefficient of thermal expansion such that the metallic material 18 in the underlying workpiece will expand and contract similarly during temperature fluctuations..." Col. 7, lines 13-16. Thus, Applicants respectfully submit that including the Bragg grating sensor of Ames in the molten metallic

material of Haake that expands and contracts along with the workpiece could not even result in determining the tension in the fibers. Again, in Haake, the optical fiber does not have such a purpose. It merely is used to detect a fracture of the workpiece by becoming damaged itself as a result of the fracture.

Further yet, Applicants respectfully submit that one of ordinary skill in the art would not understand the teachings of Ames for a pitch or roll sensor with a Bragg grating sensor to apply to a recess introduced into a surface of a workpiece. Ames does not even use the Bragg grating sensor to measure any parameters associated with a workpiece. Ames merely measures pitch and roll. Therefore, Applicants respectfully submit that Ames ***teaches away from*** including a Bragg grating sensor in a surface of a workpiece.

Therefore, Applicants respectfully submit that independent claims 1 and 12 are allowable for at least these reasons over Haake and Ames.

Applicants respectfully submit that the application is now in condition for allowance with claims 1, 5-12, 15, 17, and 19-28 being allowable.

If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned. If required, this paper should be considered as a Petition for Extension of Time. Please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket No. 011235.52686US).

Respectfully submitted,

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